

A String of Volcanoes

Living with a **VOLCANO** in Your Backyard
MOUNT RAINIER



Grade Level: 3-9

Learner Objectives:

Students will:

- Become familiar with important aspects about each of the Cascade volcanoes
- Identify sources of information about Cascade volcanoes, in Washington, Oregon, and California

Setting: Classroom

Timeframe: 50 minutes—research;
50 minutes—mobile construction

Materials:

- Crayons or colored pencils
- USGS Fact Sheet 165-97 (optional)
- Scissors
- Glue
- Internet access or library resources
- Copies of “*A String of Volcanoes*” student page
- Copies of “*A String of Volcanoes Mobile Pieces*”



**Living with a Volcano in Your Backyard-
An Educator's Guide with Emphasis on
Mount Rainier**

Prepared in collaboration with the National Park Service

General Information Publication 19

U.S. Department of the Interior
U.S. Geological Survey

Overview

Students research information about Cascade volcanoes in Washington, Oregon, and California, and then transfer information onto appropriate mobile piece before constructing the mobile **A String of Cascade Volcanoes**.

Teacher Background

Refer to U.S. Geological Survey Fact Sheet 165-97 for general information about Cascade volcanoes and their locations in the Cascade Range. Find additional information in related activities, including **Cascade Volcano Timeline**, **Volcano Hall of Fame**, and **Surrounded by Volcanoes**.

Procedure

What to do Before Class Begins

Assemble grade-appropriate resources for student research. Cut string to required lengths.

1. Provide each student or student group with “*A String of Volcanoes*” student page and “*A String of Volcanoes—Mobile Pieces*.”
2. Students research information from Internet, library resources, or USGS Fact Sheet and write it on volcano mobile pieces before coloring and assembling mobile. Most answers can be found at the U.S. Geological Survey websites.
3. Construct the mobile for one, two or three states using instructions using one of two methods proposed on the student page.

1

A String Of Volcanoes

Chapter 1

- Kite string or yarn for mobile: 4.3 meters (approximately 14 feet) for single string; 5 meters (approximate 17 feet) for either mobile arrangement

Vocabulary: Caldera, cinder cone, eruption, debris avalanche, debris flow, lahar, landslide, lava dome, lava flows, pyroclastic flow, shield volcano, steam explosion, stratovolcano, tephra, volcanic ash

Skills: Data collection, ordering, researching

Benchmarks:

Geography:

The student uses maps, charts, and other geographic tools to understand the spatial arrangement of people, places, resources, and environments on Earth's surface

- 1 – Use and construct maps, charts, and other resources to gather and interpret geographic information
 - 1.1.2a – Use globes, a variety of map projections, satellite imagery, and Geographic Information System (GIS) data to interpret information from a spatial perspective
 - 1.2 – Recognize spatial patterns on Earth's surface and understand the processes that create these patterns
 - 1.2.2a – Locate physical and human features and events on maps and globes

Assessment

Use **A String of Volcanoes** as a learning tool, and **Volcano Hall of Fame** as an assessment of students' knowledge about important aspects of Cascade volcanoes. After completing these two activities, students should be able to identify important aspects of Cascade volcanoes and identify sources of information. Assess each student's ability to identify important aspects and to record them.

References

Dzurisin, D., Stauffer, Peter H., Hendley, James W., 1997, Living with Volcanic Risk in the Cascades: U.S. Geological Survey Fact Sheet 165-97, 2p.

Harris, S. L., 2005, Fire Mountains of the West: The Cascade and Mono Lake volcanoes. Mountain Press Publishing Company, 3rd edition, 454 p.

Tilling, R. I., Topinka, L. and Swanson, D.A., 1990, Eruptions of Mount St. Helens (Revised edition): Past, present, and future: U.S. Geological Survey series of General Interest Publications, 57 p.

Refer to **Internet Resources Page** for a list of resources available as a supplement to this activity.



A String of Volcanoes

The Cascade volcanoes extend from southern British Columbia, Canada, to northern California. To learn more about these volcanoes, make a string of volcanoes using the **“String of Volcanoes”** mobile templates. Use the Internet or library resources to research information about each volcano. Hang the **“String of Volcanoes”** mobile in your home or classroom.

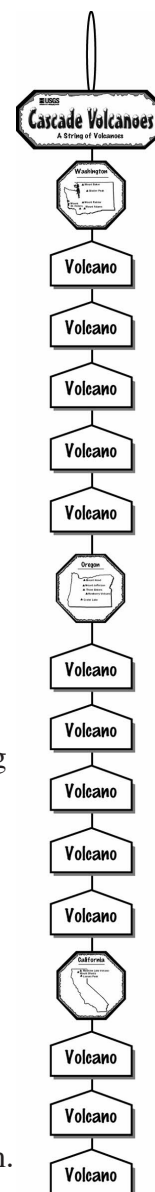
Instructions:

- ① Fill in the blanks on mobile pieces with information that you have researched on the Internet, in library books, or other materials provided by your teacher.
- ② Color the volcanoes (most are snow capped and have trees, but some also have lakes or meadows).
- ③ Cut out each mobile piece along the outline and fold each piece in half along the dotted line.
- ④ Cut out the small black triangle along the bottom (folded) edge.
- ⑤ Assemble mobile starting at top with title piece, followed by state map and then the volcanoes for each state. You can hang volcanoes in one long string (*assembly method A*) or hang a triangular piece of cardboard horizontally below the title and hang a state from each corner (*assembly method B*). Your teacher will tell you which method to use. Follow the appropriate instructions below.

Assembly Method A.

Instructions for hanging volcanoes of Washington, Oregon and California singly, or together on one long string.

- ① Cut a piece of string 4.3 meter (14 foot) long. To make a loop for hanging, bend the string into an 18 centimeter (7 inch) long loop at one end of the string that will extend upward from the center top of the title piece. Run the remainder of the string through hole at the center bottom of title piece and tie a knot just below it. Glue string in place and glue title piece closed.
- ② Add the state map, then the volcano mobile pieces. Run a glue line around edges and down center of the backside of the next volcano piece.
- ③ Place the glue side of the volcano piece face up. Slide the volcano piece onto the string, through the hole you cut in bottom (folded) edge. Place top edge of next volcano piece 5 centimeters (2 inches) below the bottom of the previous piece.
- ④ Press the volcano piece closed and adjust on the string for balance and location. Tie a knot in string at bottom of the volcano piece. Make sure the string is glued in place.
- ⑤ Repeat steps 2 through 4 for each volcano piece of the mobile.
- ⑥ Tie a large knot below bottom piece and trim off excess string.
- ⑦ Balance mobile by adding weights inside individual volcano piece.

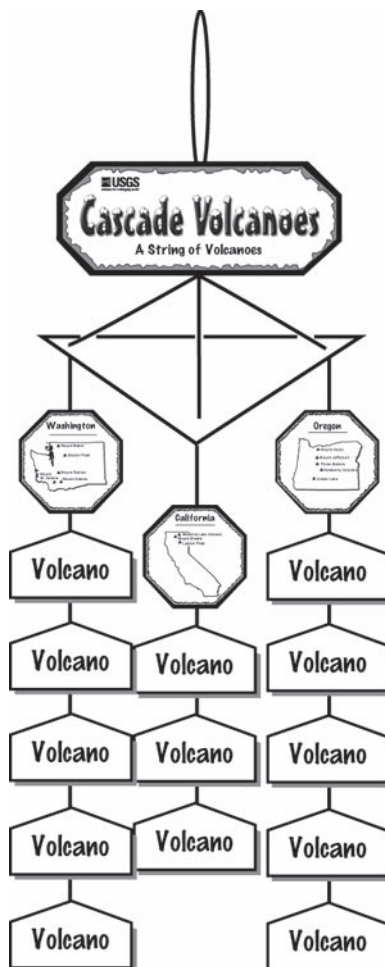


A String of Volcanoes continued...

Assembly Method B.

Instructions for hanging volcanoes for the states of Washington, Oregon, and California side-by-side.

- ① Cut a triangular piece of cardboard that will be suspended horizontally below the title piece, for the purpose of separating the three strings of volcano pieces. Make each side of the triangle about 25 centimeters (approximately 10 inches) long.
- ② Make a loop above the title piece for hanging the mobile. Do so by cutting three pieces of string 1.7 meters (5-feet) long. Make an 18 centimeter-long (7 inch long) loop that extends above the center of the title piece. Tie a knot to secure all three strings at the bottom of the loop.
- ③ Run the three pieces of string through the hole at the bottom of the title piece and glue the string in place. Now glue title piece closed and tie a knot below the bottom of the title piece.
- ④ Add the cardboard triangular spacer. Punch a small hole in each corner of the cardboard triangle. Suspend the triangle 7–10 centimeters (3–4 inches) below title by running each string through a different hole. Knot each string below triangle (try to keep triangle hanging evenly).
- ⑤ Add the state map and volcano pieces using instructions two through seven in Method A.



Is Mount St. Helens north or south of Mount Adams? Since they are at almost the same latitude you may want to hang them side-by-side. If so, cut two small triangles in the bottom of Mount Rainier (one on each side about 1.3 centimeters (half inch) from the edge). Cut two pieces of string 30 centimeters (one foot) long and tie knots in the tops. Pull string through new holes and secure knot inside with glue. Hang Mount St. Helens and Mount Adams on strings as instructed in steps 2 through 7.



The knots you tie help support pieces in the event that the glue does not hold. You will need to tie big knots if you make big holes. Or, tie the knots around matchsticks.



A String of Volcanoes

► **Note to teacher:** Most answers can be found on web pages of the U.S. Geological Survey's Volcano Hazards Program. For filling in the blanks on the individual volcano cutouts, there is a broad range of good answers from detailed scientific, to historic (like "volcano named after..."), to personal (like "went there on vacation last year"). The elevation of several volcanoes has multiple correct answers depending on which publication or topographic map is used for research. Older students could determine latitude and longitude.

Mount Baker

Location: Northwestern Washington

Elevation: 3,285 meters (10,781 feet or 10,778, depending on source)

Closest cities: Bellingham, Washington; Vancouver, British Columbia

Most recent volcanic activity: Landslide and lahar in 1891; increased steam and heat in 1975

Most likely volcano hazards: Lahars and landslides, lava flows, pyroclastic flows, minor tephra

Another fact about this volcano: Stratovolcano; known by American Indians as Kulshan; named after Joseph Baker, a third lieutenant with British explorer George Vancouver; second most glacier ice of volcanoes in Cascades, public often reports steaming of Sherman Crater

Glacier Peak

Location: Northern Washington

Elevation: 3,213 meters (10,541 feet)

Closest cities: Everett and Seattle, Washington

Most recent volcanic activity: Small steam explosion approximately 300 years ago

Most likely volcano hazards: Tephra, lava flows and domes, pyroclastic flows, lahars

Another fact about this volcano: Stratovolcano; most remote of the Cascade volcanoes; not prominently visible from metropolitan centers; did not appear on maps under current name until 1898



A String of Volcanoes continued...

Mount Rainier -----◆-----

Location: West central Washington

Elevation: 4,392 meters (14, 410 feet)

Closest cities: Tacoma, Seattle, Olympia, and Yakima, Washington

Most recent volcanic activity: Small steam explosions during nineteenth century

Most likely volcano hazards: Lahars (greatest hazard in terms of effect), lava flows, pyroclastic flows, landslides

Another fact about this volcano: Stratovolcano; named Tahoma by Native Americans; named after Rear Admiral Peter Rainier in 1792; highest peak in the Cascades; volume of ice and perennial snow is equivalent to the volume on all other Cascade volcanoes combined—a major hazard during an eruption

Mount St. Helens -----◆-----

Location: Southwest Washington

Elevation: 2,549 meters (crater rim 8,364 feet)

Closest cities: Vancouver, Kelso, and Longview Washington; Portland, Oregon

Most recent volcanic activity: Landslides, eruptions and lahars on May 18, 1980, followed by eruptions of tephra and lava-dome building eruptions between 1980 and 1986; small eruptions in 1989-1991; steam and ash eruptions in 2004; dome-building eruptions in 2004 and 2005

Most likely volcano hazards: Tephra, pyroclastic flows, lahars, lava flows

Another fact about this volcano: Stratovolcano; known by American Indians as Loowit; most frequently active volcano in the Cascades during the last 4,000 years; 1980 eruptions and lahars caused one billion dollars in damage—most expensive volcanic event in United States history; summit elevation was 9,677 feet before landslide and eruptions of May 18, 1980; dome-building eruptions of 2004-05 are rebuilding the mountain

Mount Adams -----◆-----

Location: South central Washington

Elevation: 3,742 meters (12,276 feet)

Closest cities: White Salmon, Yakima, Washington; Hood River, Oregon

Most recent volcanic activity: Approximately one thousand years ago there were eruptions of lava and tephra

Most likely volcano hazards: Lava flows, landslide, lahars

Another fact about this volcano: Stratovolcano; known by American Indians as Pahto or Klickitat; second highest of the volcanoes in Washington; about 6,000 years ago, a lahar inundated about fifteen square kilometers (six square miles) of the lowland and dammed a stream to form Trout Lake; sulfur was mined near summit during 1930's



A String of Volcanoes continued...

Mount Hood -----◆-----

Location: Northern Oregon

Elevation: 3,426 meters (11,239 feet)

Closest cities: The Dalles, Hood River, Troutdale and Portland, Oregon; White Salmon and Vancouver Washington

Most recent volcanic activity: Numerous nineteenth century steam eruptions; most recent major eruption occurred in 1780's; formed lava domes, pyroclastic flows and lahars

Most likely volcano hazards: Lava flows and domes, pyroclastic flows, lahars

Another fact about this volcano: Stratovolcano; named Wy'east by American Indians Oregon's most recently erupting volcano; highest peak in Oregon; only Oregon volcano to produce yearly earthquake swarms; eruption in 1780's triggered lahar in Sandy River valley that reached the Columbia River and formed a delta of quicksand; Lewis and Clark noted this in their journals and named river the "Quicksand River"

Mount Jefferson -----◆-----

Location: North central Oregon

Elevation: 3,199 meters (10,495 feet)

Closest cities: Bend, Madras and Salem, Oregon

Most recent volcanic activity: lava flows and domes, pyroclastic flows and lahars during the last ice age

Most likely volcano hazards: Tephra, landslides, lahars, future eruptions likely to be from smaller adjacent volcanoes

Another fact about this volcano: Stratovolcano; least active volcano in the Cascade Range—no known eruptions during the last 20,000 years; erupted repeatedly for hundreds of thousands of years, with its last eruptive episode during the ice ages; Lewis and Clark named this volcano in honor of President Thomas Jefferson

Three Sisters -----◆-----

Location: Central Oregon

Elevation: North Sister 3,074 meters (10,085 feet); Middle Sister 3,062 meters (10,047 feet); South Sister 3,157 meters (10,358 feet)

Closest cities: Bend, Oregon

Most recent volcanic activity: Approximately two thousand years ago on flanks of South Sister

Most likely volcano hazards: Tephra, lava flows, pyroclastic flows, lahars

Another fact about this volcano: Stratovolcanoes, named by a group of Methodist missionaries; a broad area of volcanic uplift (about 2.5 centimeters per year (one inch per year)) is ongoing just west of South Sister; these three volcanoes have the closest spacing of any major stratovolcanoes in the Cascade Range



A String of Volcanoes continued...

Newberry Crater◆.....

Location: Central Oregon

Elevation: 2,434 meters (7,985 feet)

Closest cities: Bend, Oregon

Most recent volcanic activity: Big Obsidian Flow (lava flow) formed 1,300 years ago

Most likely volcano hazards: Lava flows, tephra and lahars

Another fact about this volcano: Shield volcano; covers 1,300 square kilometers (500 square miles); lava flows extend to city of Bend, Oregon, and beyond; more than 400 cinder cones dot the flanks of this volcano

Crater Lake◆.....

Location: Southern Oregon

Elevation: 2,487 meters (8,156 feet) (lake is 594 meters deep (1,949 feet))

Closest cities: Medford and Klamath Falls, Oregon

Most recent volcanic activity: Ancient Mount Mazama erupted and formed Crater Lake caldera 7,700 years ago; Wizard Island and underwater cones erupted between 7,700 and 4,800 years ago

Most likely volcano hazards: Tephra, pyroclastic flows

Another fact about this volcano: Mount Mazama was a cluster of volcanoes—not a single cone; caldera-building eruption 7,700 years ago was the largest eruption to take place at a Cascade volcano during the past 100,000 years; caldera-forming eruption scattered gritty volcanic ash that can be found today, across Washington, Oregon and southern Canada; Native Americans witnessed the collapse of this volcano and kept the event alive in their legends; Crater Lake is the deepest lake in the United States

Medicine Lake Volcano◆.....

Location: Northern California

Elevation: 2,376 meters (7,762 feet)

Closest cities: Klamath Falls, Oregon

Most recent volcanic activity: Approximately 900 years ago

Most likely volcano hazards: Lava flows, pyroclastic flows, tephra

Another fact about this volcano: Shield volcano, by volume the largest volcano in the Cascade Range; well known for its extensive system of lava tube caves—at least 435; rugged volcanic landscape sheltered Native Americans of the Modoc War of 1872-1873



A String of Volcanoes continued...

Mount Shasta

Location: Northern California

Elevation: 4,317 meters, (14,161 feet)

Closest cities: Mount Shasta City and McCloud, California

Most recent volcanic activity: 1786 eruptions of steam and ash

Most likely volcano hazards: Lava flows and domes, pyroclastic flows, tephra, lahars

Another fact about this volcano: Mount Shasta has erupted every 600 to 800 years for past 10,000 years; debris avalanche (landslide) 300,000 years ago spread at least 45 cubic kilometers (6.2 cubic miles) of rock debris over surface ten times larger than debris avalanche at Mount St. Helens in 1980; smaller cone Shastina was formed between 9,700 and 9,400 years before present

Lassen Peak

Location: Northern California

Elevation: 3,187 meters (10,457 feet)

Closest cities: Redding, Red Bluff, California

Most recent volcanic activity: 1914 – 1917 eruptions of steam, tephra and lava flows caused pyroclastic flows, lahars, and new dome growth

Most likely volcano hazards: Lava flows and domes, pyroclastic flows, lahars

Another fact about this volcano: Lassen Peak in large part consists of overlapping lava domes; named Tehama by American Indians; Bumpass Hell is the largest geothermal area in the Cascades—it has bubbling mud pots, steaming fumaroles, and pools of boiling water

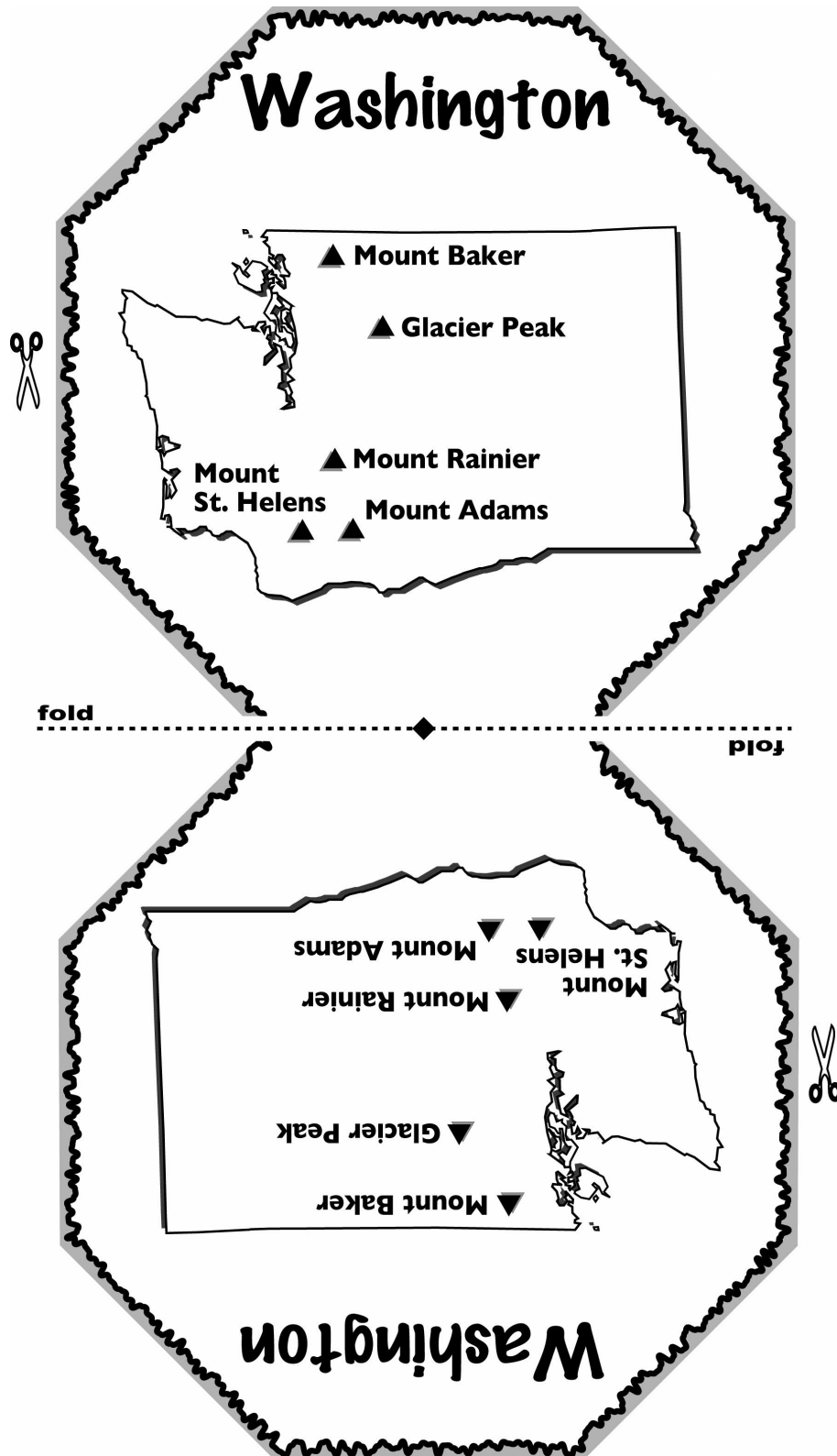


A String of Volcanoes - Mobile Pieces





A String of Volcanoes - Mobile Pieces





A String of Volcanoes - Mobile Pieces



Mount Baker

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Location _____

Elevation _____

Closest cities _____

Most recent volcanic activity _____

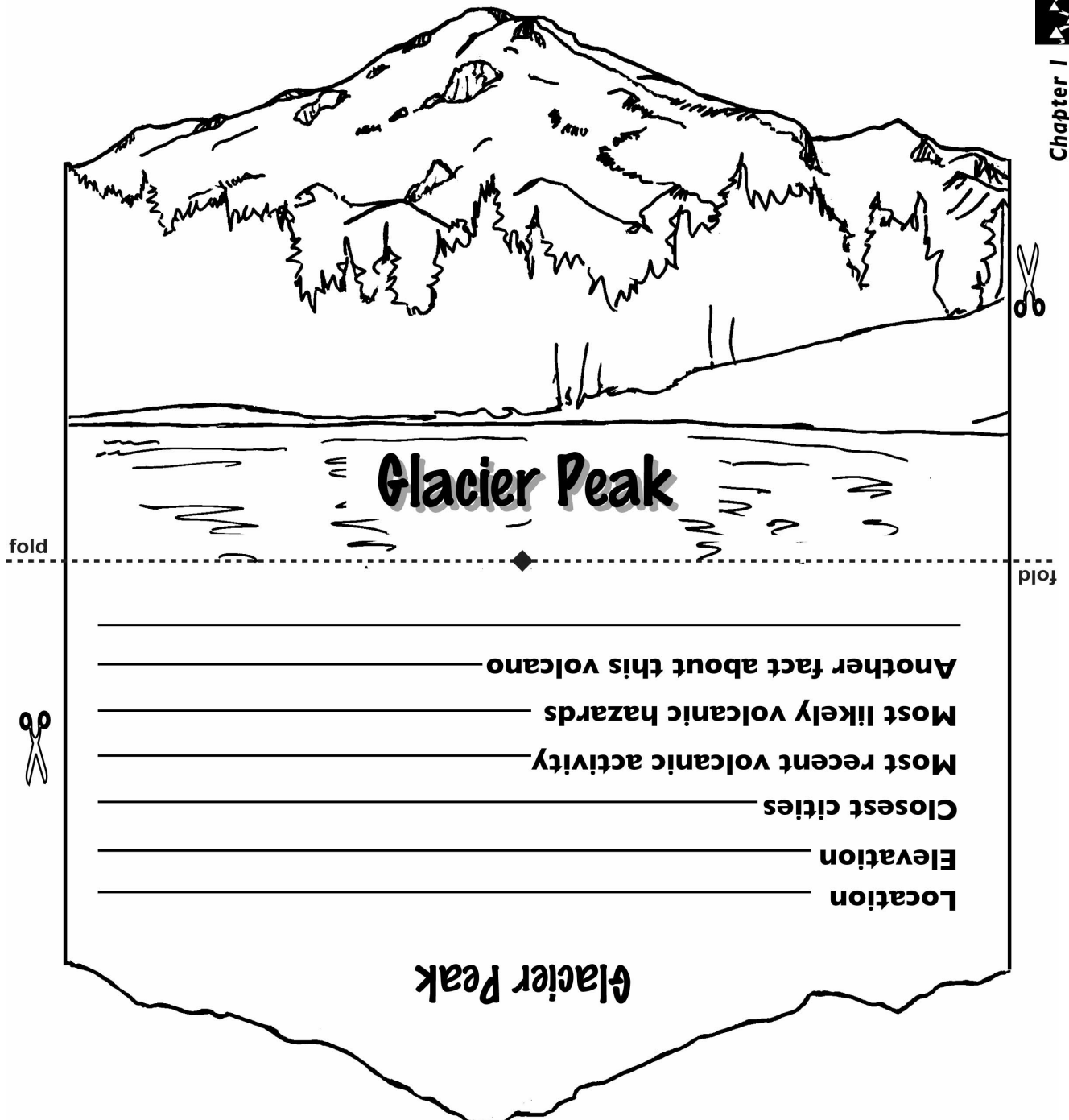
Most likely volcanic hazards _____

Another fact about this volcano _____

Mount Baker

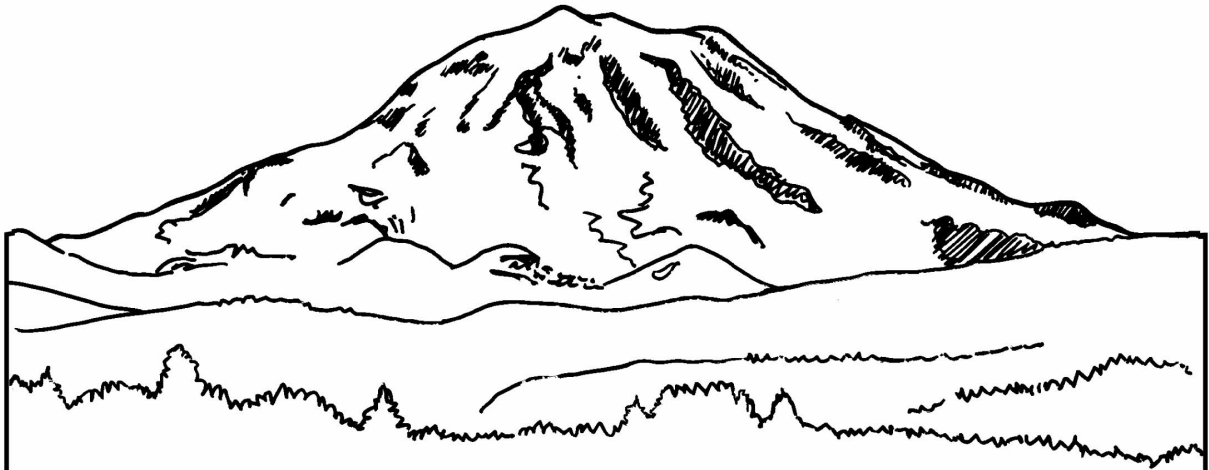


A String of Volcanoes - Mobile Pieces





A String of Volcanoes - Mobile Pieces



Mount Rainier

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fold



_____ Another fact about this volcano

_____ Most likely volcanic hazards

_____ Most recent volcanic activity

_____ Closest cities


_____ Elevation

_____ Location

Mount Rainier



A String of Volcanoes - Mobile Pieces



Mount St. Helens

fold

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scissors

scissors

Mount St. Helens

Location _____

Elevation _____ Location _____ dome _____ new dome _____

Closest cities _____

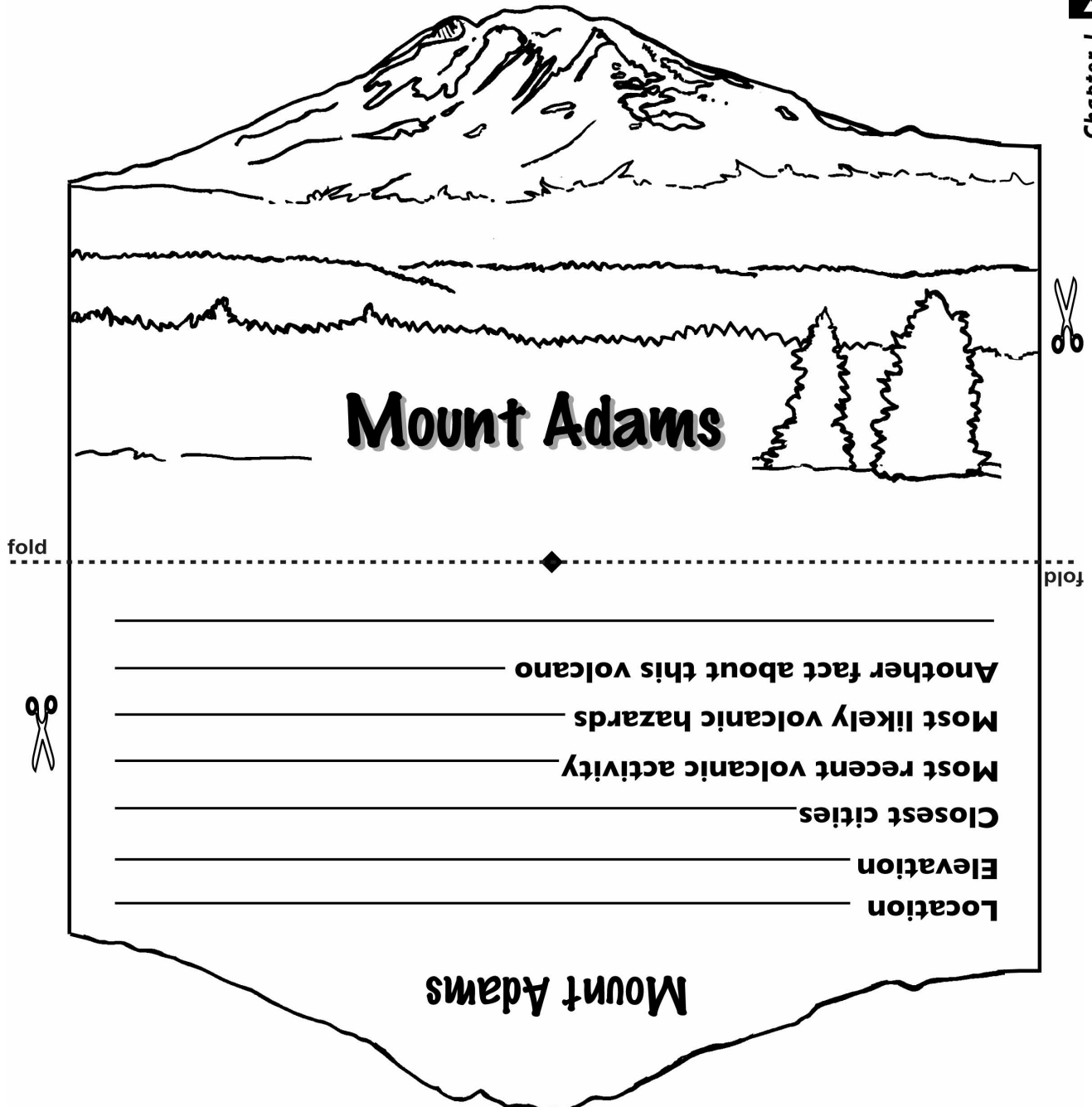
Most recent volcanic activity _____

Most likely volcanic hazards _____

Another fact about this volcano _____

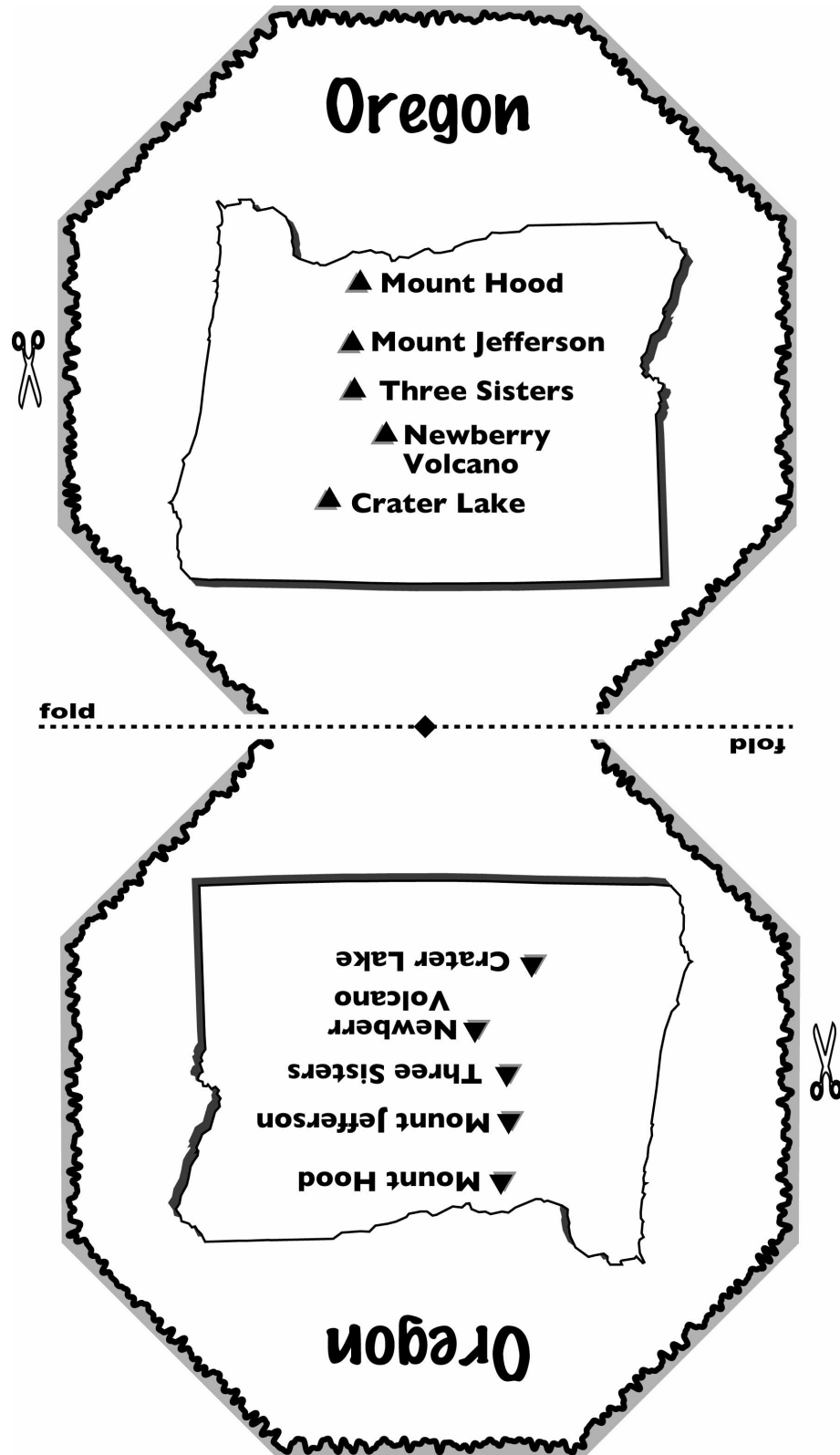


A String of Volcanoes - Mobile Pieces



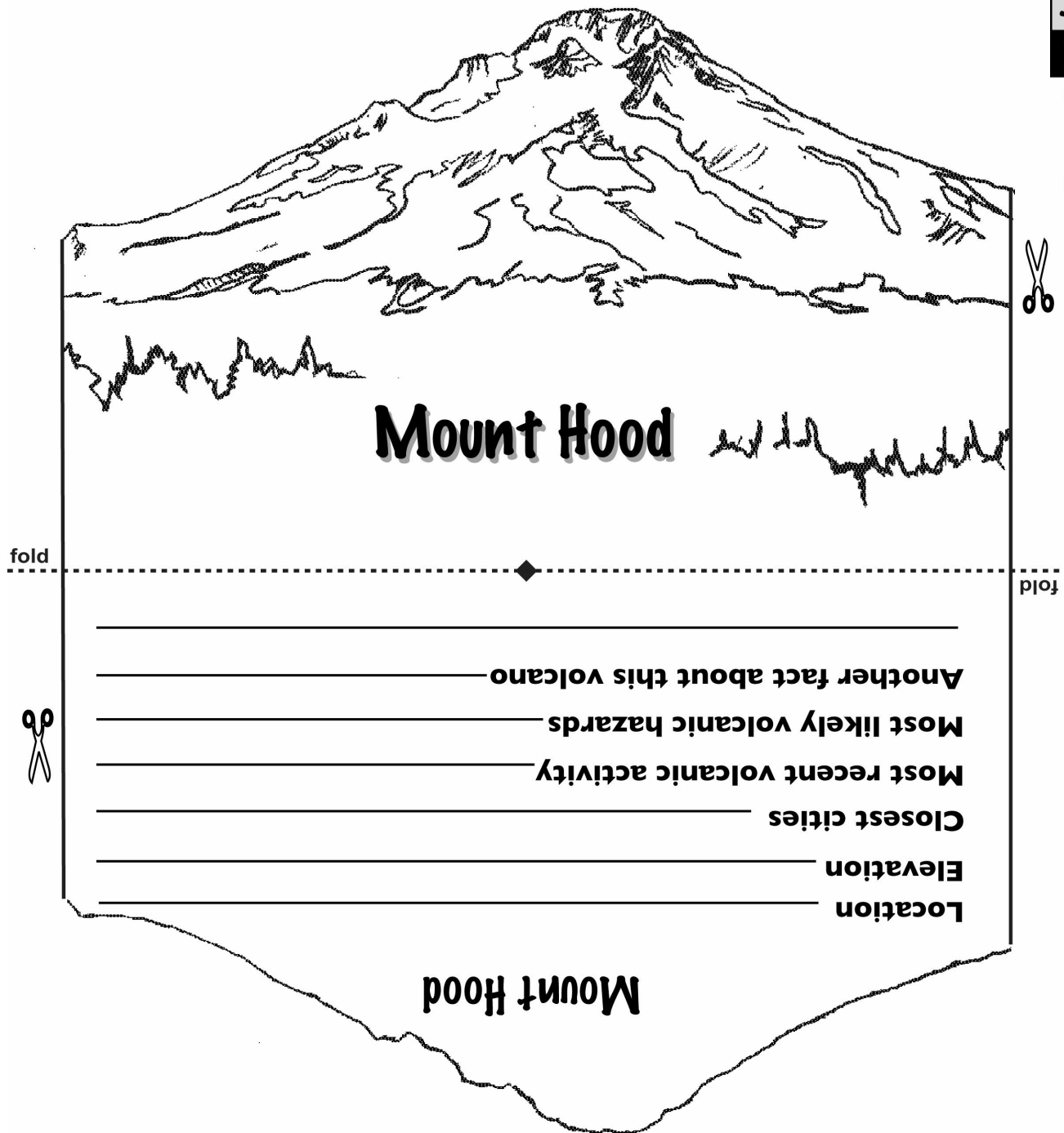


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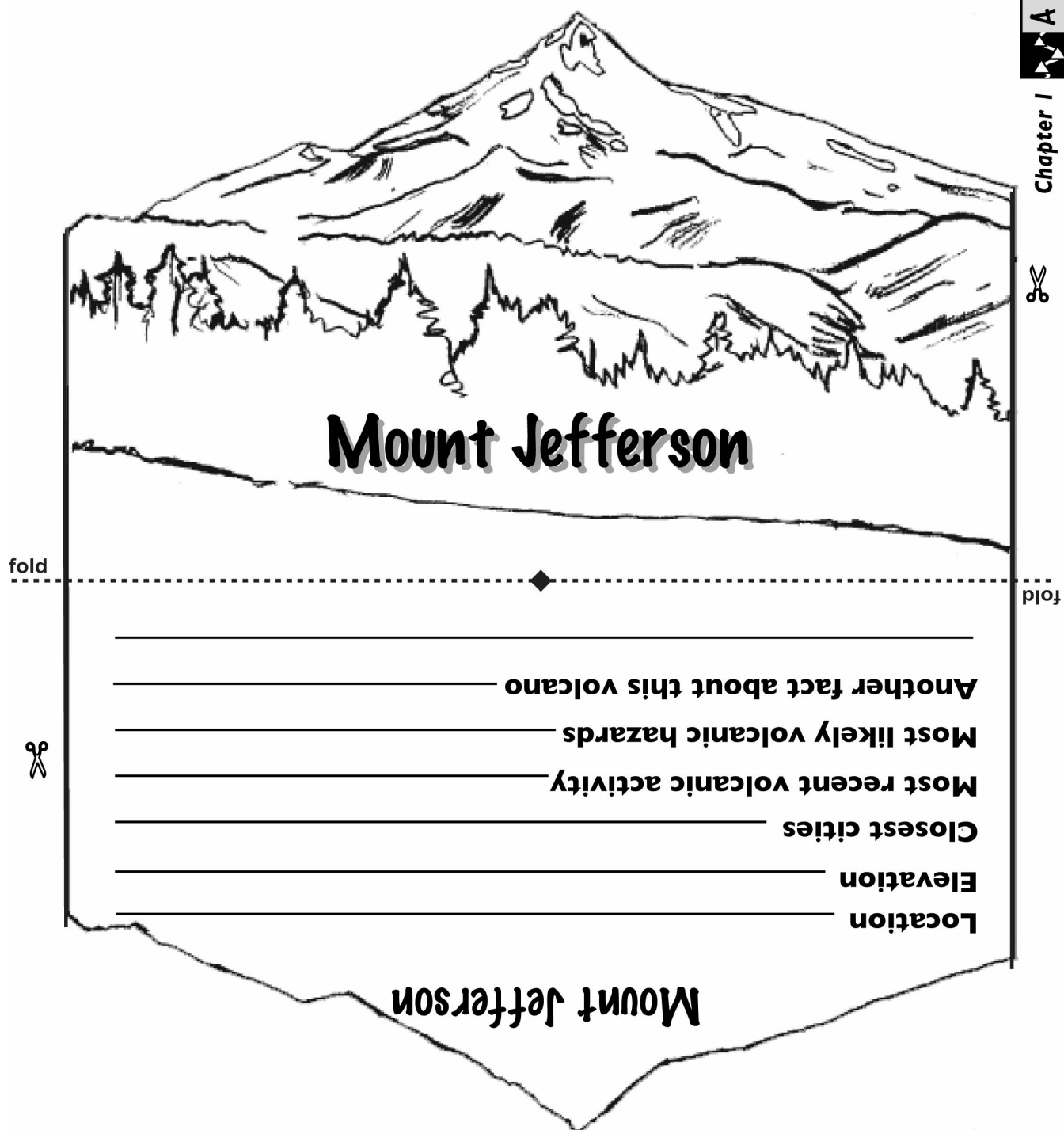


A String of Volcanoes - Mobile Pieces



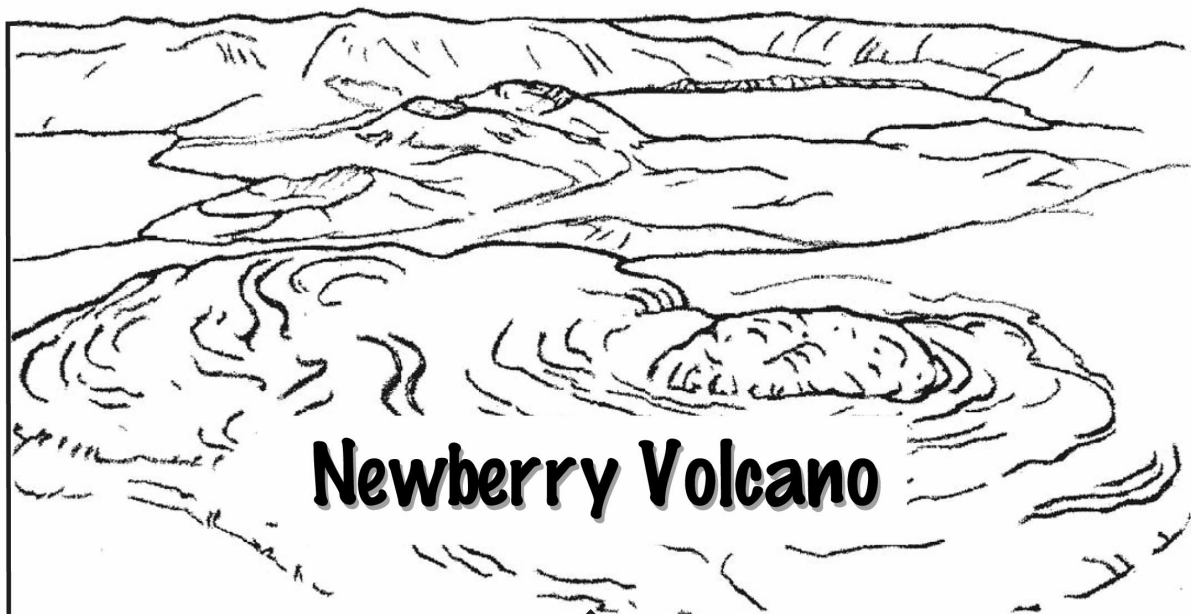


A String of Volcanoes -Mobile Pieces





A String of Volcanoes - Mobile Pieces



fold

fold



Newberry Volcano

Location

Elevation

Closest cities

Most recent volcanic activity

Most likely volcanic hazards

Another fact about this volcano



A String of Volcanoes - Mobile Pieces



Three Sisters

fold

fold



Location _____

Elevation _____

Closest cities _____

Most recent volcanic activity _____

Most likely volcanic hazards _____

Another fact about this volcano _____

Three Sisters



A String of Volcanoes - Mobile Pieces



Crater Lake

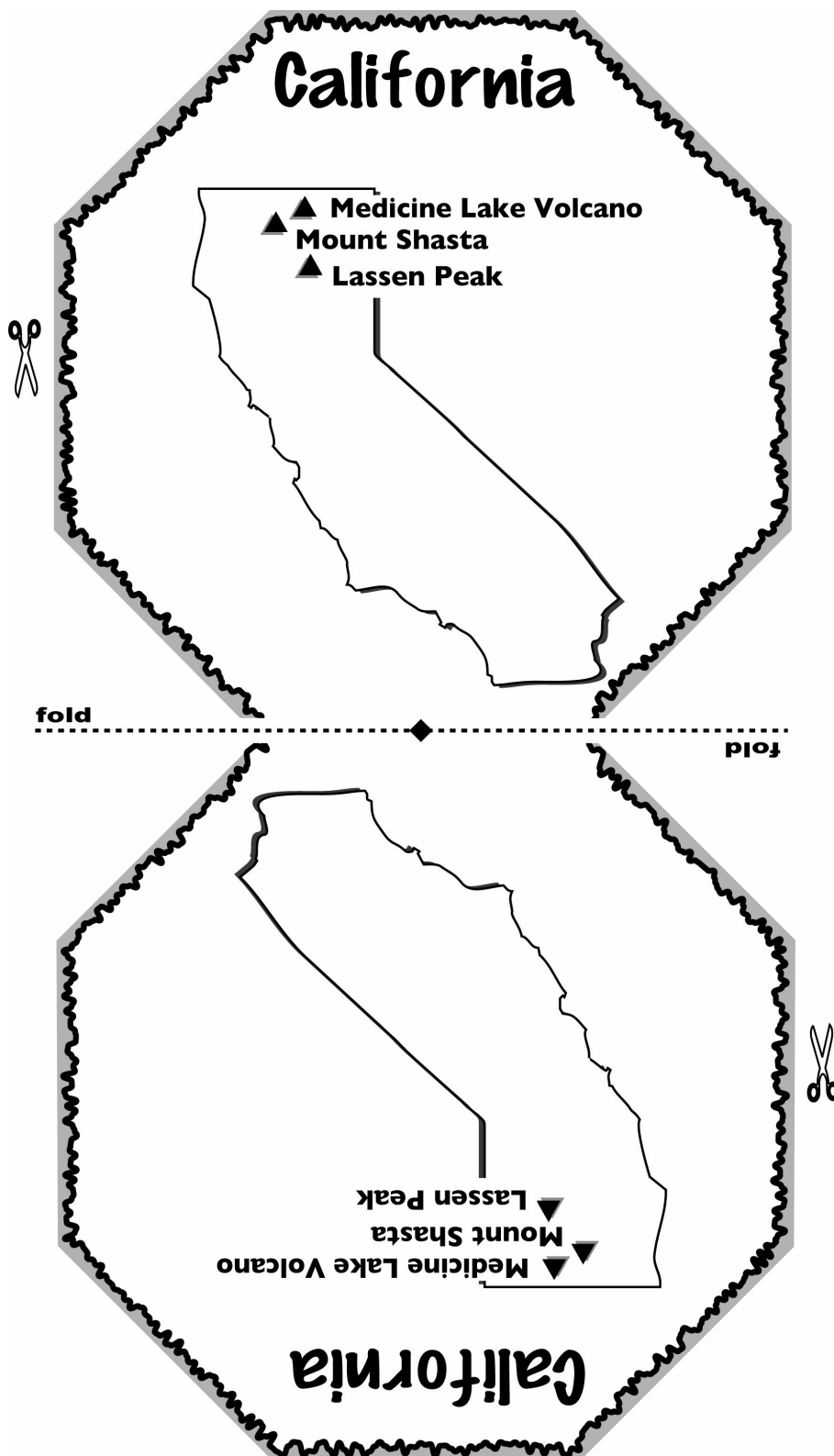
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Crater Lake

A String of Volcanoes - Mobile Pieces





A String of Volcanoes - Mobile Pieces



Medicine Lake Volcano

Location _____

Elevation _____

Closest cities _____


Most recent volcanic activity _____

Most likely volcanic hazards _____


Another fact about this volcano _____

Medicine Lake Volcano

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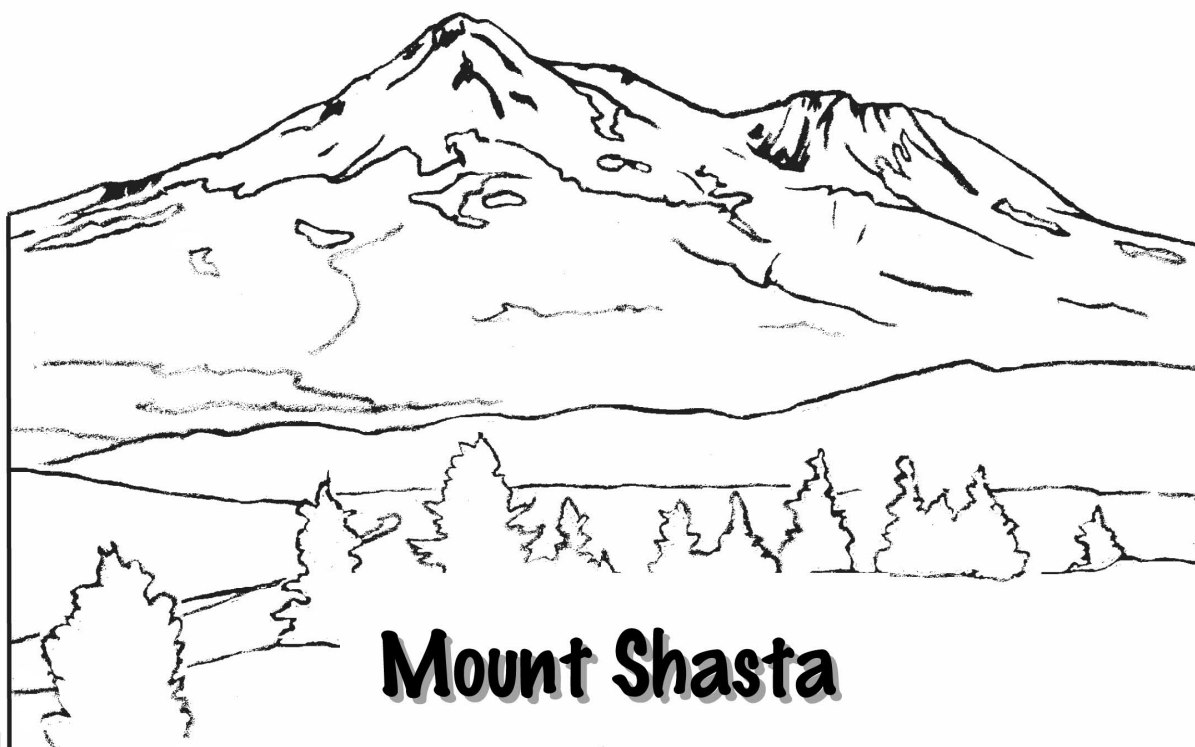


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A String of Volcanoes - Mobile Pieces



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Location _____

Elevation _____

Closest cities _____

Most recent volcanic activity _____

Most likely volcanic hazards _____

Another fact about this volcano _____

Mount Shasta



A String of Volcanoes - Mobile Pieces

